STEREO
Attitude Interface Electronics (AIE)
& Attitude Flight Computer (AFC)
Hardware Description

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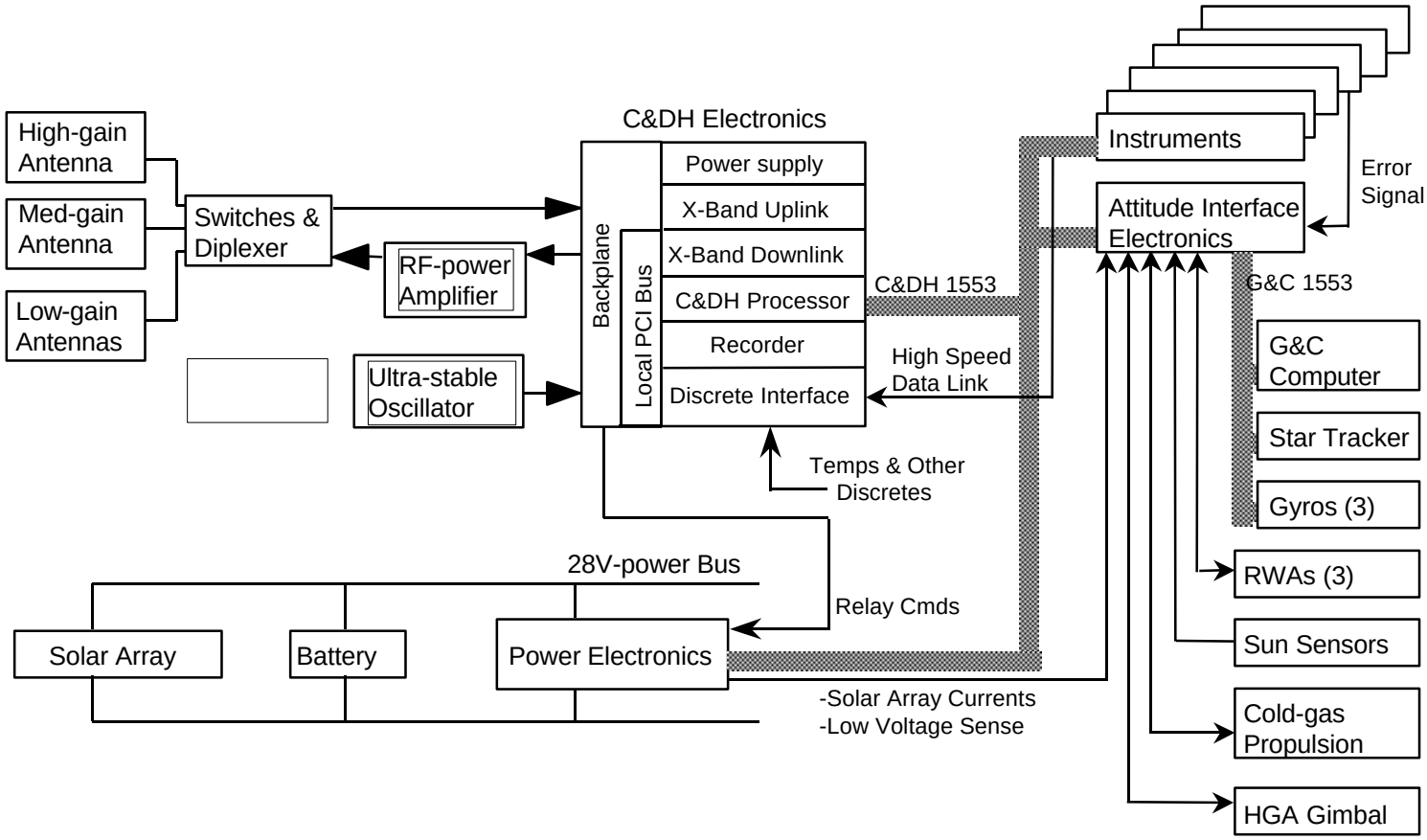
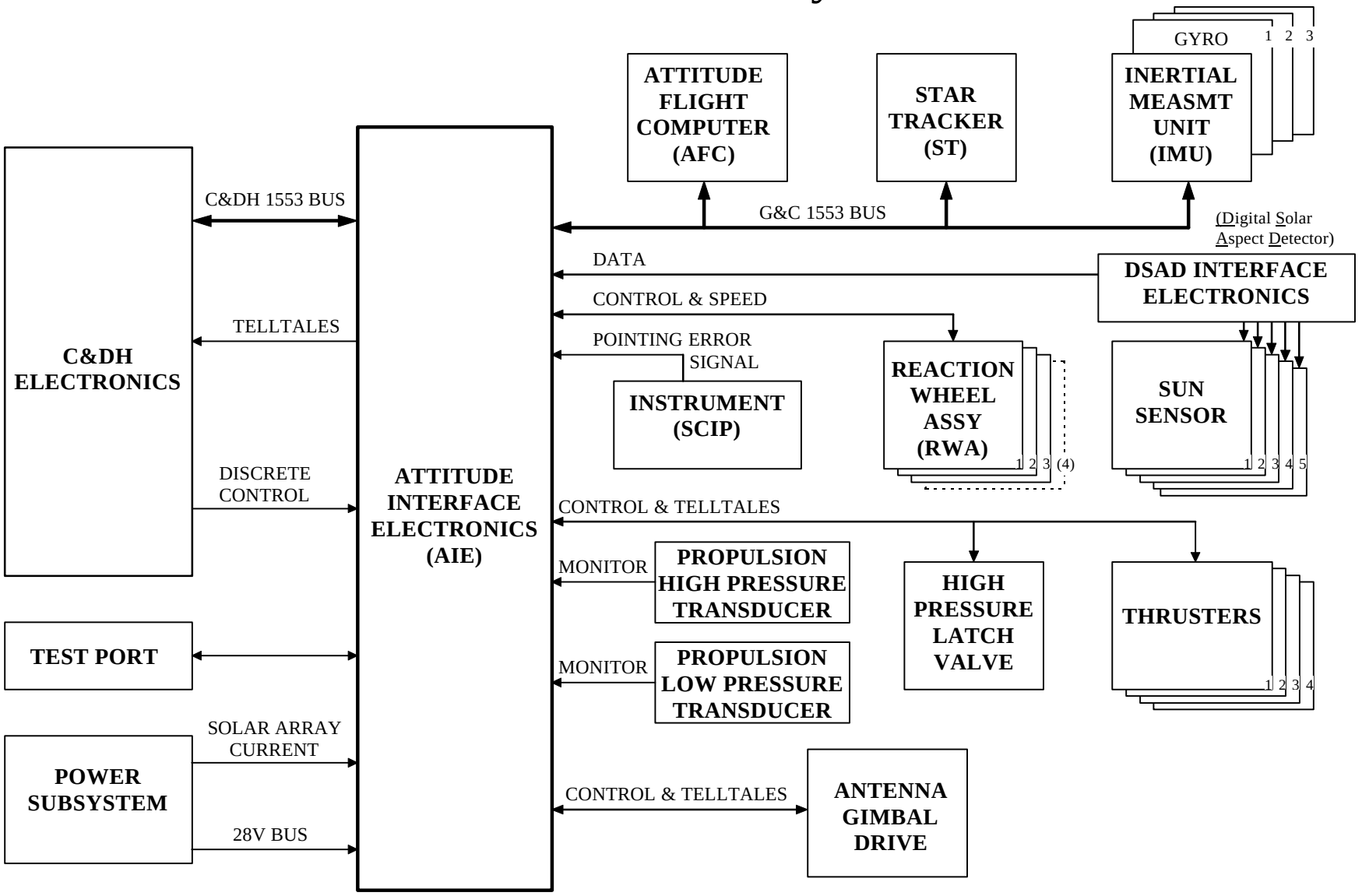
Spacecraft Block Diagram



AIE Hardware Requirements

- Provide the interface between the Guidance and Control System (G&C) and the Command & Data Handling System(C&DH)
- Provide the interface between the G&C system components
- Autonomously execute spacecraft attitude safing operations

G&C Hardware System



AIE Baseline Hardware Implementation

- Single string modified TIMED implementation
  - Four printed circuit board assembly with motherboard:
    - > Processor Card: RTX2010RH @ 12MHz, 64Kwords RAM & EEPROM
    - > 1553 Card: Two MIL-STD-1553 bus ports (C&DH and G&C)
    - > Analog Interface Card: Accommodates subsystem analog interfaces
    - > Digital Card: Accommodates subsystem digital interfaces and relay control functions.
  - Relay Matrix: For IMU (gyro) control, propulsion system control, and antenna gimbal control
  - DC/DC Converter Board: 28V bus primary

- Processor and 1553 cards would be, for the most part, unchanged.
- Analog Interface and Digital cards should be considered as new designs to accommodate new G&C subsystems.

AFC Hardware Requirements & Implementation

- Requirements:
  - CPU: 32-bit architecture
  - Memory: (x)Mbytes SRAM, (y)Mbytes Flash EEPROM
  - I/O: MIL-STD-1553 Bus

- Implementation: Use same processor design as that for the C&DH processor
  - Mongoose-V, @12Mhz, 2MByte SRAM, 4MByte EEPROM, 1MByte console boot ROM, 1553 bus, PCI bus(unused).
  - May need to identify and incorporate alternative SRAM and EEPROM components (parts used on TIMED may no longer be available)
  - Board layout modifications required to accommodate new and/or increased memory requirements.
  - DC/DC Converter and Housing design unchanged from TIMED design.

Mass, Power & Heritage

	Mass	Power	Heritage
AIE	4.5Kg	11W (@28V)	TIMED, but with some new design
AFC	2.5Kg	10W (@28V)	TIMED

Candidate Trade Studies

- AIE Processor Upgrade
  - Hardware upgrade costs versus software development cost
- Attitude Flight Computer: Make versus Buy
  - Significant processor upgrade to possibly eliminate the need for an AIE processor
  - Lowest combined hardware/software development cost option wins
- G&C Configuration Options:
  - Relocate AFC inside the C&DH Integrated Electronics Module (IEM) to save mass and power (single 1553 bus in AIE) and to eliminate the need to fabricate a separate housing.